

Plant Pest ID Based on Signs & Symptoms

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Objectives

- Learn about insect metamorphosis and feeding and how it relates to pest identification.
- Learn terms that describe insect damage symptoms on plants.
- Relate damage to pest groups.

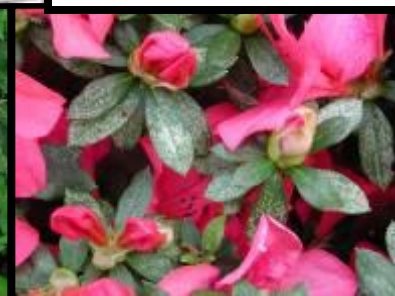


Diversity of plants, landscapes & horticultural zones

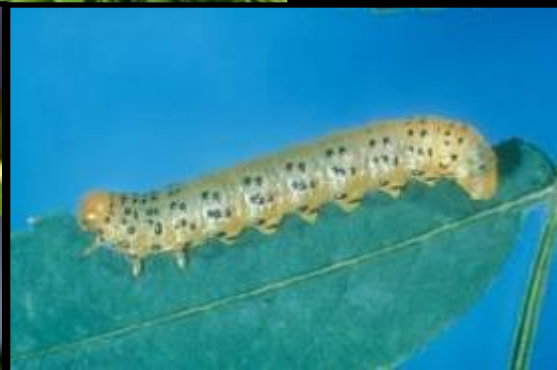


Average Annual Minimum Temperature

Temperature (F)	Zone
Below -50	1
-45 to -50	2a
-40 to -45	2b
-35 to -40	3a
-30 to -35	3b
-25 to -30	4a
-20 to -25	4b
-15 to -20	5a
-10 to -15	5b
-5 to -10	6a
0 to -5	6b
5 to 10	7a
10 to 15	7b
15 to 20	8a
20 to 25	8b
25 to 30	9a
30 to 35	9b
35 to 40	10a
40 to 45	10b
40 +	11



Diversity of Insects & Mites



G. J. Lenhard

So, how do we make sense of it all?



Insect Development

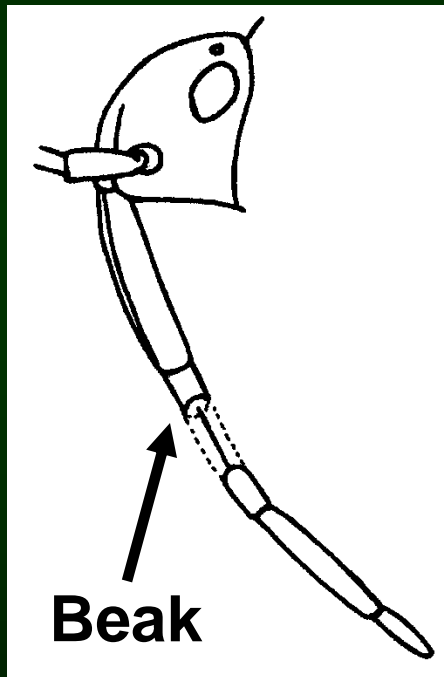
Incomplete (simple) metamorphosis



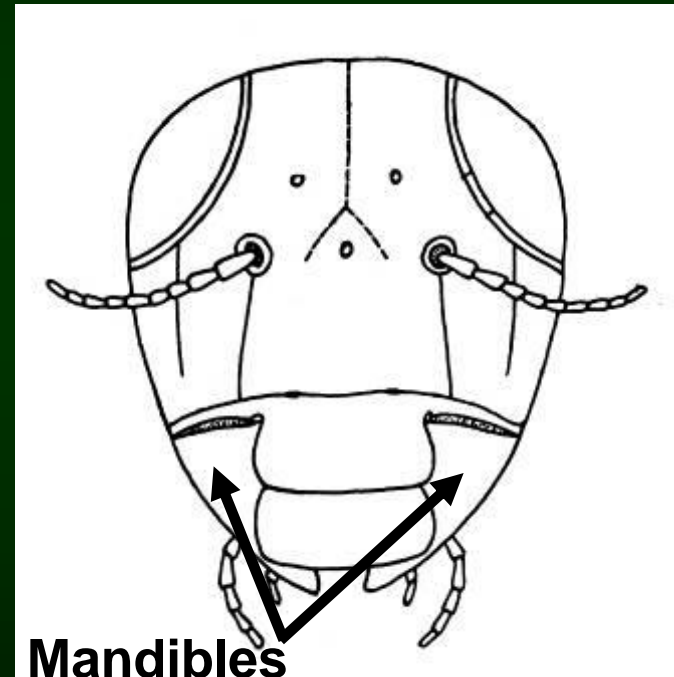
Complete metamorphosis



Insect Mouthparts



Piercing / Sucking



Chewing

Ways to Group Insects & Mites that Attack Trees and Shrubs

- By the plant damage
 - Leaf injury, stippling, ...
- By insect taxonomy
 - Beetles, caterpillars, flies, ...

Things to Find Out...

- What is the tree / shrub species?
 - Remember "key plant - key pest"
- Where is the damage located?
 - Leaves, branches, bark, stem, roots, ...
- What kind of damage is it?
 - Defoliation, stippling, wood boring, ...
- Is the actual pest still present?
 - Collect specimens for ID

Symptoms of Leaf Damage

- **Chewing:**

- Free-feeding, skeletonizing, notching, shot-hole feeding, window-feeding, leaf rolling/folding/tying, and leaf mining

- **Piercing-sucking:**

- Stippling/yellowing/chlorosis, distortion/deformity, and thinning/dieback

Orders of Defoliating Insects

- **Lepidoptera** (moth & butterfly larvae)
- **Coleoptera** (leaf beetles, weevils, scarabs)
- **Hymenoptera** (sawflies, leafcutting ants and bees)
- **Orthoptera** (grasshoppers, walkingsticks)
- **Diptera** (flies)

Free-feeding



Skeletonizing



Japanese beetle

Notching Damage



Myllocerus weevil on shaving brush tree



Leaf cutter bee

Shot Hole-feeding



Flea beetle adult damage

Window-feeding



Flea beetle larvae

Leaf Rollers, Folders, and Tiers



Leafrolling weevil



Ficus thrips



Needle tier



Redbud leaf folder



Sweetgum leaftier

Leaf / needle mining

Insect feeding between the upper & lower epidermis



Linear mines



Serpentine mine



Blotch mines



Digitate mines

Tent Makers and Webworms



Eastern tent caterpillar



Fall webworm

Sapfeeding / Sucking Pests

- **Thysanoptera (Thrips)**
- **Hemiptera:**
 - True bugs: Plant/leaf bugs, lace bugs
 - Bug-like insects: Leaf/plant/tree hoppers, psyllids, aphids, whiteflies, mealybugs, scales
- **Acari (Mites)**



Stippling / Yellowing / Chlorosis



Lace bugs



Scales



Whiteflies



Thrips



Spider mites

Distortion / Deformity

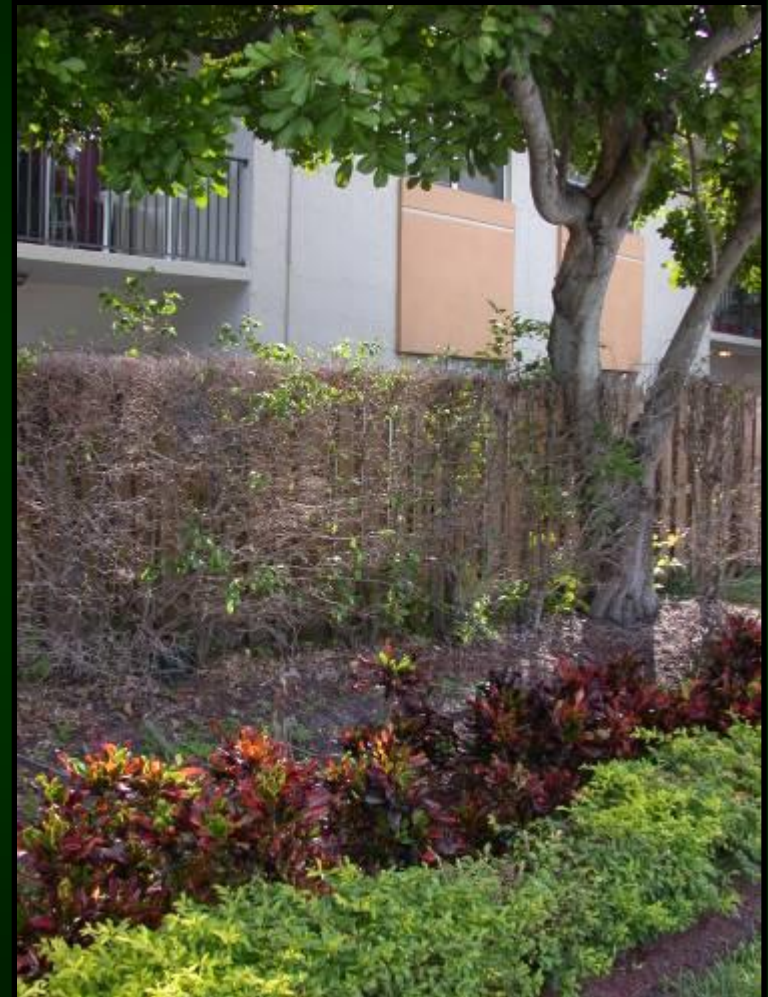


Pink hibiscus mealybug

Thinning / Dieback



Grenade scale on hibiscus



Ficus whitefly on fig

Signs of Leaf Damage

- **Chewing:**
 - Cast skins, egg shells, pupal cases, silken tents, frass on the ground
- **Piercing-sucking:**
 - Honeydew, sooty mold, white wax,

Honeydew / Sooty Mold



Asian citrus psyllid



Florida wax scale



Redgum lerp psyllid



Lobate lac scale

White Waxy Flocking



Woolly aphids



Whiteflies



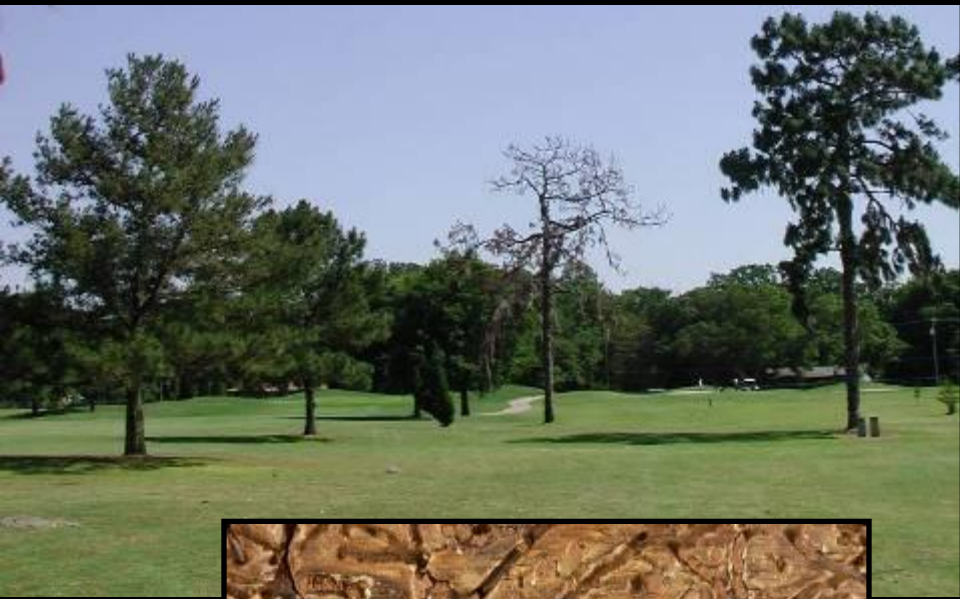
Leafhoppers

Wood-Boring Insects

- **Lepidoptera**
 - Clearwing borers
- **Coleoptera**
 - Flat-headed borers
 - Round-headed borers
 - Ambrosia beetles
 - Weevil borers
- **Hymenoptera**
 - Horntails



Crown Dieback



Wood /
phloem
boring



Bark beetle galleries



Root
feeding



Flagging Damage



Internal shoot-boring

External bark damage

Insect feeds on or lays eggs in bark



Bark scoring



Egg-laying damage
by treehoppers



Cicada egg-
laying slits

Gall-Makers

Flies



Wasps



Even More Gall-Makers

Aphids



Psyllids



Eriophyid Mites



Thank you!

Photos contributed by:

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